



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,454	01/22/2002	Kimio Akiyama	Q68004	6920
7590	05/18/2004			
Sughrue Mion 2100 Pennsylvania Avenue NW Washington, DC 20037-3213				
EXAMINER YAMNITZKY, MARIE ROSE				
ART UNIT		PAPER NUMBER		
1774				

DATE MAILED: 05/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/031,454

Applicant(s)

AKIYAMA ET AL.

Examiner

Marie R. Yamnitzky

Art Unit

1774

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

Art Unit: 1774

1. This Office action is in response to applicant's amendment filed March 03, 2004, which amends the specification and claims 3, 4, 13 and 14.

Claims 1-20 are pending.

2. The objection to the disclosure as set forth in the Office action mailed October 03, 2003 is overcome by applicant's amendment.

The rejection of claims 3, 4, 13 and 14 under 35 U.S.C. 112, second paragraph, as set forth in the October 3<sup>rd</sup> action is overcome by applicant's amendment.

3. Claims 1-20 stand rejected under 35 U.S.C. 112, first paragraph, for reasons of record in the Office action mailed October 03, 2003.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Baldo et al. in *Nature*, Vol. 403, pp. 750-753 (February 17, 2000) for reasons of record in the Office action mailed October 03, 2003.

6. Applicant's arguments filed March 03, 2004 have been fully considered but they are not persuasive.

Regarding the rejection under 35 U.S.C. 112, first paragraph, applicant argues that pages 19-22 of the specification instruct how to select combinations of compounds. Applicant argues that combinations of compounds meeting the claimed energy relationship can be readily accomplished by first determining the second compound and then choosing the first compound having the lowest excited triplet state with a higher energy level than the energy level of the excited triplet state (higher than that of the lowest excited singlet state) of the second compound.

It is not clear from the specification and from the prior art of record that all second compounds having a lowest excited singlet state lower in energy than the lowest excited triplet state of the first compound necessarily have an excited triplet state that lies between the lowest excited singlet state of the second compound and the lowest excited triplet state of the first compound. (If they do, the device of Baldo et al. in *Nature*, Vol. 403, inherently meets the limitations of the present claims.) While applicant has provided a description of methods that can be used to determine whether a particular combination of compounds meets the limitations of the first and second compounds as required by the present claims, applicant has provided insufficient guidance to determine the full scope of combinations of compounds meeting the limitations of the first and second compounds without undue experimentation. Absent the availability, through text books or other publications, of data regarding energy levels of excited triplet and singlet states, particularly excited triplet states, of the numerous organic compounds that can potentially be used as the first and/or second compounds in the presently claimed device, one of ordinary skill in the art at the time of the invention would have to test numerous

combinations of two organic light-emitting materials in order to determine the scope of combinations meeting the limitations of the present claims. The present claims require one of ordinary skill in the art to know not only the energy levels of the lowest excited triplet and singlet states of organic compounds, but also to know the energy level of excited triplet states other than the lowest excited triplet state.

With respect to the Kobayashi article, applicant argues that changes in energy levels of a compound in going from one condition to another do not necessarily have to be taken into consideration because the choice of compounds for the present invention is based on energy levels in the condition under which the compounds are used. This argument is confusing because the methods described on pages 19-22 of the specification for determining lowest excited singlet state, lowest excited triplet state, and triplet states other than lowest excited triplet state, do not test the compounds as present in an electroluminescent device. The conditions under which the compounds are tested as described on pages 19-22 of the specification are not the conditions experienced by the compounds when present in the light-emitting layer of an electroluminescent device. In addition, the claims do not limit the conditions under which the energy levels of excited triplet and singlet states must be determined.

With respect to the rejection under 35 U.S.C. 103(a), applicant argues that energy transfer according to the present invention is from the excited triplet state of the first compound to the excited triplet state of the second compound. Applicant argues that Baldo's device has low emission quantum efficiency and energy transfer occurs from the excited triplet state of the first compound to the excited singlet state of the second compound. Applicant further argues that

Baldo is silent with respect to the relationship between the lowest excited triplet state of the first compound and the lowest excited singlet state of the second compound.

$\text{Ir(ppy)}_3$  is a phosphorescent emitter whereas DCM2 is a fluorescent emitter. Therefore, it is reasonable to expect that the energy level of the peak emission wavelength of  $\text{Ir(ppy)}_3$  is the energy level of the lowest excited triplet state of  $\text{Ir(ppy)}_3$  and the energy level of the peak emission wavelength of DCM2 is the energy level of the lowest excited singlet state of DCM2. Baldo inherently discloses the relationship between the lowest excited triplet state of the first compound and the lowest excited singlet state of the second compound in disclosing that the peak emission wavelength for  $\text{Ir(ppy)}_3$ , has a shorter wavelength (and thus, inherently, a higher energy) than the peak emission wavelength for DCM2.

Applicant further argues that Baldo does not teach or suggest improvement in light emission efficiency obtained by energy transfer proceeding from the excited triplet state of the first compound to the excited triplet state of the second compound to the excited singlet state of the second compound.

Baldo discloses transfer of energy from lowest excited triplet state of a first compound to lowest excited singlet state of a second compound, but does not disclose that energy transfer takes place via intermediate transfer to an excited triplet state of the second compound other than the lowest excited triplet state of the second compound. (In the present proposed invention, the excited triplet state of the second compound that is limited relative to the lowest excited triplet state of the first compound and the lowest excited singlet state of the second compound is not the lowest excited triplet state of the second compound.) The data set forth in the specification are insufficient to demonstrate that this intermediate transfer of energy provides an unexpected

Art Unit: 1774

improvement in light emission efficiency compared to the triplet to singlet energy transfer that occurs in Baldo's devices.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

8. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for Art Unit 1774 is (703) 872-9306 for all official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY  
May 16, 2004



**MARIE YAMNITZKY  
PRIMARY EXAMINER**

1774